LIFSHITS, Ye. M.

56-7-59/66

AUTHOR DZYALOSHINSKIY, I.Ye., LIFSHITS, Ye.M.

TITLE A Bhase Transitic.. of Second ..ind in Sodium Saltpeter. (Fazovyy perekhod vtorogo rodav natriyevoy selitre - Russian)

PERIODICAL Zhurnal Eksperim,i Teoret.Fiziki, 1957, Vol 33, Nr 7, pp 299-301 (USSR)

ABSTRACT The present paper investigates this phase transition in connection with the measurements carried out by M-O.Kornfeld and A.A.Chudinov, Zhurn.Eksp.i Teoret.Fiz., 1957, Vol 33, Nr 7, pp 33. These authors investigated the temperature dependence of the elastic constants of sodium saltpeter mear the point of transition. Below this point two molecules are located in the elementary cell of the $NaNO_3$-crystal, the two NO_3 groups having two different crystallographical orientations. Above the point of transition all differences between the NO_3 groups vanish, because each of them may, with the same degree of probability, assume one of the two possible orientations. The volume of the elementary cell is here reduced by one half. Thus, the transition is connected with the order of the NO_3 groups. The here discussed phase transition is described by a parameter η, which, in the case of all transformations (to which belong also the translations) of the symmetry group (of the phase D^5_{3d}, corresponding to the high temperature) are transformed like the function sin $\pi(x+y+z)$. Herefrom it follows that in connection with the development of the thermodynamic potential the term which is proportional to η^3 is lacking, so that this transition is actually realizable as a transition of the second kind. For the determination of the modification of the elastic coef-

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24 PHASE I BOOK EXPLOITATION SOV/1787

Landau, Lev Davydovich, and Yevgeniy Mikhaylovich Lifshits

Mekhanika (Mechanics) Moscow, Fizmatgiz, 1958. 206 p. (Series: Teoreticheskaya fizika, t. 1) 35,000 copies printed.

Ed.: B.L. Livshits; Tech. Ed.: S.N. Akhlamov.

PURPOSE: This book may be useful to engineers, scientific research workers, and vuz students in the field of mechanics.

COVERAGE: The book is the first volume of the new edition of the authors' Theoretical Physics. The book discusses equations of motion and their integration, impact of particles, vibrations about a position of stable equilibrium, motion of a rigid body, and canonical equations. The succeeding volumes will be: 2) The Theory of the Field, 3) Quantum Mechanics (Nonrelativistic Theory), 4) Relativistic Quantum Theory, 5) Statistical Physics, 6) Hydrodynamics, 7) Elasticity Theory, 8) Electrodynamics of Continuous Media, and 9) Physical Kinetics. The authors thank I.Ye. Dzyaloshinskiy and L.P. Pitayevskiy. L. Pyatigorskiy is mentioned as having contributed to this field. There are no references.

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LIFSHITS, Ye. M.

Statistical Physics, by L.D. Landau and Ye.M. Lifshits. London, Paris, Pergamon Press; Reading, Mass., Addision-Wesley, 1958

484 p. Diagrs. (Theoretical Physics, Vol. 5)

Translated from the original Russian: Statisticheskaya Fizika, Moscow, 1951.

LIFSHITS, Ye. M., and LANDAU, L. D.

Quantum Mechanics, Non-Relativistic Theory, Vol. 3, Course of Theoretical Physics, Translated from Russian, by J. B.Sykes and J. S. Bell. 515pp. Pergamon Press Ltd., England; for US and Canada, Addison Wesley Publ. Co., Ins. Reading Mass, 1958.

53-64-3-5/8

AUTHORS: Deryagin, B. V., Abrikosova, I. I. Lifshits, Ye. M.

TITLE: The Molecular Attraction of Condensed Bodies (Molekulyarnoye prityazheniye kondensirovannykh tel)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 3, pp. 493-528 (USSR)

ABSTRACT: The present survey is divided into: introduction, the theories of molecular interaction between micro-objects, and a critique of their use with macro-objects, the theory of molecular attraction between condensed bodies, the method of measurement (the principal scheme of measurement, the objects of measurement, the microweights with inverse binding for the measurement of the interaction force between solids, the beam of balance, compensating and follow-up systems, the constructive shape of the apparatus, the process of measurements, the adjusting, the regulation and calibration of weights, the method of measurement of the distance between the bodies to be investigated, the preparation of the surfaces to be investigated), the results of the measurements. The discussion of

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The Molecular Attraction of Condensed Bodies 53-64-3-5/8

the results (the analysis of the measuring results, the comparison with theory, a comparison with the macroscopic theory of molecular attraction, the use in the theory of coagulation and in the theory of dampening). There are 19 figures, 1 table, and 27 references, 12 of which are Soviet.

1. Molecules--Magnetic properties 2. Molecules--Theory

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LIFSHITS, Ye. M.

"Superfluidity", Scientific American, Vol. 198, No. 6, June 1958.

When liquid helium is cooled to 2.2 degrees above absolute zero, its flows without friction. A Soviet physicist describes how this strange fluid exhibits the quantum properties of individual atoms.

LIFSHITS, YE. M.

LIFSHITZ, YE. M.

Fluid mechanics, by Lev. D. Landau and E. M. Lifshitz.

London, Pergamon Press, Reading, Mass., Addison-Wesley

Pub. Co., 1959.

XII, 536 p. diagrs., graphs. (Theoretical Physics,

Vol. 6.)

Translated from the original Russian: Mekhanika

sploshnykh sred. Moscow, 1954.

Bibliographical footnotes.

LIFSHITS, YE. M.

PHASE I BOOK EXPLOITATION SOV/3405

Soveshchaniye po voprosam kosmogonii. 6th, Moscow, 1957

Vnegalakticheskaya astronomiya i kosmologiya; trudy soveshchaniya (Extragalactic Astronomy and Cosmology; Transactions of the 6th Conference on Problems of Cosmogony, June 5-7, 1957) Moscow, AN SSSR, 1959. 273 p. Errata slip inserted. 1,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR.

Ed. of Publishing House: L.V. Samsonenko; Tech. Ed.: G.N. Shevchenko; Editorial Board: D.A. Frank-Kamenetskiy (Resp. Ed.) Professor; B.A. Vorontsov-Vel'yaminov, Corresponding-Member.

PURPOSE: The book is intended for astronomers and physicists studying problems of general cosmology.

COVERAGE: The book is a collection of papers on cosmogony read by scientists participating in a conference held in Moscow on June 5-7, 1957. The papers review recent observational and theoretical work in extragalactic astronomy, gravitational theory, theory of relativity, red shift, radio astronomy, formation of chemical elements, thermodynamics of the universe, entropy, etc. No personalities are mentioned. There are references following most of the reports.

10 (4)

AUTHORS: Dzyaloshinskiy, I. Ye., ~~Lifshits, Ye. M.~~, Pitayevskiy, L. P. SOV/56-37-1-36/64

TITLE: Van der Waals' Forces in Liquid Films (Van-der-Vaal'sovy sily v zhidkikh plenkakh)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1(7), pp 229 - 241 (USSR)

ABSTRACT: The authors find general formulas for the determination of the thermodynamic quantities (chemical potential) of a liquid film, and they find the limiting laws for the dependence of the chemical potential on the thickness of the film. The difficulties in the generalization of the formulas derived for the vacuum in the case in which the interspace between the bodies is filled with any medium, are now eliminated because of the general formulas (Ref 2) already derived for that part of the thermodynamic quantities of any absorbing medium which is conditioned by the electromagnetic fluctuation field with the wave lengths $\lambda \gg a$ (a denoting the interatomic distances). This field corresponds to those forces which have the same nature as the van der Waals' forces between the single molecules at large distances. At first, the stress tensor in a stratified absorbent medium is

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calculated, and in the next part the forces of molecular interaction between solids are determined. In the case of a metallic "intermediate layer" between the bodies, the force of molecular attraction passes from the law 1^{-3} at "small" distances to the law 1^{-5} at "large" distances. The authors then investigate a liquid film on the surface of a solid body. This film is assumed to be applied to a wall vertically arranged in the field of gravity. $F(1) + \rho gz = \text{const}$ is the condition for the constancy of the chemical potential along the system, for $F(1)$ is the part of its chemical potential μ depending on the film thickness. Thus, $\mu = \mu_0 + F(1)$, μ_0 denoting the chemical potential of the "massive liquid". Further, $\mu(1) + \rho gz = 0$, the function $\mu(1)$ determining all thermodynamic properties of the film. The authors then investigate some typical cases which may be present according to the character of the function $\mu(1)$: (a) If $\mu(1)$ is a monotonely falling, everywhere positive function, the liquid does not moisten the solid surface, and no field is formed. (b) If $\mu(1)$ is a monotonely increasing, everywhere negative function, this usually corresponds to a liquid which completely moistens a solid surface. On a vertical wall, a film with a thickness tending to zero at $z \rightarrow \infty$ is particularly formed. This decrease in thickness takes place at first according to the law $l \sim z^{-1/4}$, then according to $z^{-1/3}$. Subsequently, the contribution to the chemical potential caused by forces of nonelectromagnetic origin is estimated. Finally, some films of liquid helium are specially investigated. The authors thank the Academician L. D. Landau for the discussion of the problems investigated here, and Professor B. V. Deryagin for the supply of his papers. There are 3 figures and 21 references, 10 of which are Soviet.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems of the Academy of Sciences, USSR)

SUBMITTED: February 12, 1959 (initially), and March 27, 1959 (after revision)

LIFSHITS, Ye. M.

Electrodynamics of Continuous Media, by L.D. Landau and Ye. M. Lifshits. London, New York, Pergamon Press, Reading, Mass., Addison-Wesley, 1960.

x, 417 p. diagrs. (Theoretical Physics, V. 8)

Translated from the original Russian: Elektrodinamika Sploshnykh Sred, Moscow, 1959.

Bibliographical footnotes.

LIFSHITS, Ye. M.

Mechanics, by L.D. Landau and Ye.M. Lifshits. New York, Pergamon Press, Reading, Mass., Addison-Wesley, 1960.
165 p. diagrs (Course of Theoretical Physics Vol. 1)

LIFSHITS, Ye. M.

PHASE I BOOK EXPLOITATION SOV/4308

Landau, Lev Davydovich, Academician, and Yevgeniy Mikhaylovich Lifshits, Professor

Teoriya polya (Field Theory). 3rd ed., rev. Moscow, Fizmatgiz, 1960. 400 p. (Series: Teoreticheskaya fizika, t. 2) 25,000 copies printed.

Ed.: U. Ya. Margulis; Tech. Ed.: S. N. Akhlamov.

PURPOSE: This book is intended for students at schools of higher technical education.

COVERAGE: The book is the third revised edition of the second volume in a series on theoretical physics. The series will consist of the following nine volumes: 1) Mechanics, 2) Field theory, 3) Quantum mechanics (nonrelativistic theory), 4) Relativistic quantum theory, 5) Statistical physics, 6) Hydrodynamics, 7) Theory of elasticity, 8) Electrodynamics of continuous media, and 9) Physical kinetics. The present volume deals with the theory of electromagnetic and gravitational fields. The material is based on the special and general theories of relativity and the equations are derived

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on the basis of variational principles. The last two chapters are devoted to an account of the theory of gravitational fields, i. e., the general theory of relativity. No previous knowledge of tensor analysis is required of the reader, as it is explained parallel with the development of the theory. The present third edition has been considerably revised by comparison with the second edition, which appeared in 1948. The authors thank L. P. Gor'kov, I. Ye. Dzyaloshinskiy, and L. P. Pitayevskiy. There are no references.

TABLE OF CONTENTS:

LIFSHITS, YE.M.

S/056/60/039/01/19/029
B006/B063

AUTHORS: Lifshits, Ye. M., Khalatnikov, I. M.

TITLE: On the Singularities of Cosmological Solutions of the Gravitational Equations. I

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 1(7), pp. 149-157

TEXT: The usualloy applied cosmological solution of the Einstein gravitational equation is based on the assumption of an entirely homogeneous and isotropic mass distribution in space though this assumption is at most approximately satisfied. In the present paper, the authors wanted to clarify as to how far the properties of the solution and, above all, the occurrence of time singularities are connected with this assumption. This problem can be tackled most successfully by studying the general properties of the solutions to gravitational equations in the neighborhood of singularities. The existence of such solutions is assumed. Two particular classes of these solutions are given. One of them is a generalization of

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S/056/60/039/003/032/045
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AUTHORS: Lifshits, Ye. M., Khalatnikov, I. M.

TITLE: Singularities of the Cosmological Solutions of Gravitational Equations. II

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 3(9), pp. 800-808

TEXT: The sub-classes of cosmological solutions of gravitational equations derived in Ref. 1 (Part I of the present paper) usually have singularities. The question as to whether the existence of singularities is a general property of cosmological solutions, irrespective of the assumptions made for the distribution of matter and the field of gravity, has not been solved as yet. The solution of this problem is related to the existence or non-existence of a general solution of gravitational equations. Thus, the authors were confronted with the following problem: Within the region of a singularity that is assumed to exist, the form of the broadest class of solutions to gravitational equations is to be found, and conclusions are to be drawn as to the universal character of

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3,1900(1538,1057)

AUTHORS: Lifshits, Ye. M., Sudakov, V. V., Khalatnikov, I. M.

TITLE: Singularities of cosmological solutions of gravitation equations. III

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 6, 1961, 1847-1855

TEXT: In earlier papers (Refs. 1,2: ZhETF, 39, 149, 1960; ZhETF, 39, 800, 1960), Ye. M. Lifshits and I. M. Khalatnikov studied the form of the cosmological solution of gravitation equations near a point with time singularity. The general solution of gravitation equations with a fictitious singularity may be represented (by a proper choice of a synchronous reference system) in a form in which the singularity is synchronous for the entire space. Such a solution must contain eight arbitrary solutions of the three spatial coordinates: 1) four "physically different" functions, necessary to establish the gravitational field at a certain initial moment, 2) one function determining the initial hyper-

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surface in the geometrical structure, 3) three functions related to the requirement that the conditions $g_{00} = -1$, $g_{0\alpha} = 0$ (1) for the metric tensor (Refs. 1,2) permit any transformation of the spatial coordinates without involving time. The arbitrary choice of the spatial coordinates may be used to bring the first terms of the expansion for the metrics near the singularity into a form in which the spatial differential length is given by the formula

$$dl^2 = g_{\alpha\beta}dx^\alpha dx^\beta = a_{ab}dx^a dx^b + (t-\varphi)^2 a_{33}dx_3^2 + 2\,(t-\varphi)^2 a_{a3}dx^a dx^3 \quad (5),$$

where the indices a,b assume the values 1,2; the quantities a_{ab}, a_{3a}, a_{33}, φ are functions of all three coordinates. These statements, together with the results of Refs. 1 and 2 lead to the conclusion that the presence of a time singularity is not a necessary property of cosmological models in the general relativity theory, and that the general case of arbitrary distribution of matter and gravitational field does not lead to such a singularity. The authors thank Academician D. L. Landau and

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Singularities of cosmological...

L. P. Pitayevskiy for discussions. There are 3 Soviet-bloc references.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems of the Academy of Sciences USSR)

SUBMITTED: January 25, 1961

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24.6100

AUTHORS: Dzyaloshinskiy, I. Ye., Lifshits, Ye. M., and Pitayevskiy, L. P.

TITLE: General theory of the Van der Waals forces

PERIODICAL: Uspekhi fizicheskikh nauk, v. 73, no. 3, 1961, 381-422

TEXT: A brief report is first given of the methods of the quantum field theory, and the general theory of the Van der Waals forces is then explained on this basis. Such a theory has been developed for the first time by Ye. M. Lifshits. The application of the methods of the quantum field theory to the problems of statistical physics at finite temperature is based on a paper by Matsubara. According to it, the free energy can be calculated by the rules of Feynman's graph technique. Matsubara's technique can be appreciably improved by taking account of some general properties of the Green functions (A. A. Abrikosov, L. P. Gor'kov, I. Ye. Dzyaloshinskiy, ZhETF 36, 1286 (1959)). The following series presented schematically must be summed

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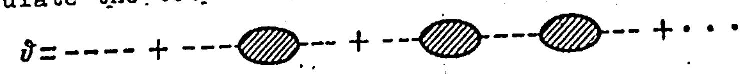
to calculate the total Green function of the photon:



In the case of a spatially inhomogeneous system it has the form

Eq. 2.8

$$\mathfrak{D}_{\alpha\beta}(r_1, r_2; \xi_n) = \mathfrak{D}^0_{\alpha\beta}(r_1, r_2; \xi_n) + \int \mathfrak{D}_{\alpha\gamma}(r_1, r_3; \xi_n)\, \Pi_{\gamma\delta}(r_3, r_4; \xi_n) \times \times \mathfrak{D}^0_{\delta\beta}(r_4, r_2; \xi_n)\, dr_3\, dr_4 + \int \mathfrak{D}^0_{\alpha\gamma}(r_1, r_3; \xi_n)\, \Pi_{\gamma\delta}(r_3, r_4; \xi_n)\, \mathfrak{D}^0_{\delta\mu}(r_4, r_5; \xi_n) \times \times \Pi_{\mu\nu}(r_5, r_6; \xi_n)\, \mathfrak{D}^0_{\nu\beta}(r_6, r_2; \xi_n)\, dr_3\, dr_4\, dr_5\, dr_6 + \dots \quad (2,8)$$

$\Pi_{ik}(\vec{r}_1, \vec{r}_2; \xi_n)$ signifies the so-called polarization operator of the system. (2.8) or, in another form,

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$$\mathfrak{D}_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) = \mathfrak{D}^0_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) + \int d\mathbf{r}_3\, d\mathbf{r}_4\, \mathfrak{D}^0_{\alpha\gamma}(\mathbf{r}_1, \mathbf{r}_3; \xi_n)\, \Pi_{\gamma\delta}(\mathbf{r}_3, \mathbf{r}_4; \xi_n) \times$$
$$\times \Big\{ \mathfrak{D}^0_{\delta\beta}(\mathbf{r}_4, \mathbf{r}_2; \xi_n) + \int d\mathbf{r}_5\, d\mathbf{r}_6\, \mathfrak{D}^0_{\delta\mu}(\mathbf{r}_4, \mathbf{r}_5; \xi_n)\, \Pi_{\mu\nu}(\mathbf{r}_5, \mathbf{r}_6; \xi_n)\, \mathfrak{D}_{\nu\beta}(\mathbf{r}_6, \mathbf{r}_2; \xi_n) + \qquad (2,8a)$$
$$+ \int d\mathbf{r}_5\, d\mathbf{r}_6\, d\mathbf{r}_7\, d\mathbf{r}_8\, \mathfrak{D}^0_{\delta\mu}(\mathbf{r}_4, \mathbf{r}_5; \xi_n)\, \Pi_{\mu\nu}(\mathbf{r}_5, \mathbf{r}_6; \xi_n)\, \mathfrak{D}^0_{\nu\lambda}(\mathbf{r}_6, \mathbf{r}_7; \xi_n) \times$$
$$\times \Pi_{\lambda\sigma}(\mathbf{r}_7, \mathbf{r}_8; \xi_n)\, \mathfrak{D}^0_{\sigma\beta}(\mathbf{r}_8, \mathbf{r}_2; \xi_n) + \ldots \Big\},$$

is an integral equation with respect to ϑ having the form

$$\mathfrak{D}_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) = \mathfrak{D}^0_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) + \int \mathfrak{D}^0_{\alpha\gamma}(\mathbf{r}_1, \mathbf{r}_3; \xi_n)\, \Pi_{\gamma\delta}(\mathbf{r}_3, \mathbf{r}_4; \xi_n)\, \mathfrak{D}^0_{\delta\beta}(\mathbf{r}_4, \mathbf{r}_2; \xi_n)\, d\mathbf{r}_3\, d\mathbf{r}_4. \qquad (2,9)$$

X

In the general case there is no expression in a closed form for the polarization operator. In the present case of longwave photons, the

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polarization operator can be expressed by the dielectric constant of the body. To calculate the additional term to the energy of a condensed body, due to the longwave fluctuations of the electromagnetic field, a part describing the energy of interaction of the particle with the electromagnetic field:

$$H = H_o + H_{int} = H_o - \int A_\alpha(\vec{r}) j_\alpha(r) d^3\vec{r},$$

is separated from the total Hamiltonian of the system. The series of the perturbation theory is represented by diagrams of the type of Fig. 7 or Fig. 8 for the free energy or the Green function of the longwave photons, respectively. In the $k_o a \ll 1$ approximation, only diagrams of the form of Fig. 7a offer a correction to the free energy. The corresponding expression for the free energy reads Eq. (3.1)

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$$F = F_0 - \frac{1}{2} T \sum_{n=-\infty}^{\infty} \Big\{ \int \Pi_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) \mathfrak{D}^0_{\beta\alpha}(\mathbf{r}_2, \mathbf{r}_1; \xi_n) d\mathbf{r}_1 d\mathbf{r}_2 + \\ + \frac{1}{2} \int \Pi_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) \mathfrak{D}^0_{\beta\gamma}(\mathbf{r}_2, \mathbf{r}_3; \xi_n) \Pi_{\gamma\delta}(\mathbf{r}_3, \mathbf{r}_4; \xi_n) \times \\ \times \mathfrak{D}^0_{\delta\alpha}(\mathbf{r}_4, \mathbf{r}_1; \xi_n) d\mathbf{r}_1 d\mathbf{r}_2 d\mathbf{r}_3 d\mathbf{r}_4 + \ldots + \frac{1}{m} \int \Pi_{\alpha\beta}(\mathbf{r}_1, \mathbf{r}_2; \xi_n) \mathfrak{D}^0_{\beta\gamma}(\mathbf{r}_2, \mathbf{r}_3; \xi_n) \ldots \\ \ldots \Pi_{\mu\nu}(\mathbf{r}_{2m-1}, \mathbf{r}_{2m}; \xi_n) \mathfrak{D}^0_{\nu\alpha}(\mathbf{r}_{2m}, \mathbf{r}_1; \xi_n) d\mathbf{r}_1 \ldots d\mathbf{r}_{2m} + \ldots \Big\}, \quad (3,1)$$

If the polarization operator $\Pi_{ik}(\vec{r}_1, \vec{r}_2; \xi_n) = \Pi_{ki}(\vec{r}_2, \vec{r}_1; -\xi_n)$ can be expressed by the dielectric constant of the body, it will be then possible in principle to express the corresponding correction to the free energy by formula (3.1). X

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$$\mathbf{f} = -\operatorname{grad} p_0 - \frac{T}{4\pi} \sum_{n=0}^{\infty}{}' \xi_n^2 \mathfrak{D}_{ii}(\mathbf{r}, \mathbf{r}; \xi_n) \operatorname{grad} \varepsilon + \frac{T}{4\pi} \sum_{n=0}^{\infty}{}' \xi_n^2 \operatorname{grad} \left\{ \mathfrak{D}_{ii}(\mathbf{r}, \mathbf{r}; \xi_n) \varrho \frac{\partial \varepsilon}{\partial \varrho} \right\}. \quad (3,17)$$

permits the ready calculation of the correction to the chemical potential of the body. The pressure is calculated next. The force can be represented by $f_i = -\partial \sigma_{ik}/\partial x_k$ with the potential tensor

$$\sigma_{ik} = -p_0 \delta_{ik} - \frac{T}{2\pi} \sum_{n=0}^{\infty}{}' \left\{ -\frac{1}{2} \delta_{ik} \left[\varepsilon(\mathbf{r}, i\xi_n) - \varrho \frac{\partial \varepsilon(\mathbf{r}, i\xi_n)}{\partial \varrho} \right] \mathfrak{D}_{ll}^{E}(\mathbf{r}, \mathbf{r}; \xi_n) + \varepsilon(\mathbf{r}, i\xi_n) \mathfrak{D}_{ik}^{E}(\mathbf{r}, \mathbf{r}; \xi_n) - \frac{1}{2} \delta_{ik} \mathfrak{D}_{ll}^{H}(\mathbf{r}, \mathbf{r}; \xi_n) + \mathfrak{D}_{ik}^{H}(\mathbf{r}, \mathbf{r}; \xi_n) \right\}. \quad (3,24)$$

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The equations (3.24) and

$$\zeta(\varrho, T) = \zeta_0(\varrho, T) + \frac{T}{4\pi} \sum_{n=0}^{\infty}{}' \frac{\partial \varepsilon(\mathbf{r}, i\xi_n)}{\partial \varrho} \mathfrak{D}_{ii}^{E}(\mathbf{r}, \mathbf{r}; \xi_n). \qquad (3,25)$$

(found by I. Ye. Dzyaloshinskiy and L. I. Pitayavskiy, ZhETF 36, 1797 (1959)) solve in principle the problem of calculating the Van der Waals part of the thermodynamic quantities of a body. The fourth part of the present paper deals with the molecular forces of interaction between solid bodies. In this connection, the general theory developed above is applied to the calculation of the Van der Waals forces between closely approached bodies. The force between the unit area of the two bodies (media 1 and 2) which are separated by a gap of width l filled with medium 3, is described by Eq. (4.13).

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$$F(l)=\frac{kT}{\pi c^3}\sum_{n=0}^{\infty}{}' \varepsilon_3^{3/2}\xi_n^3 \int_1^{\infty} p^2 \left\{ \left[\frac{(s_1+p)(s_2+p)}{(s_1-p)(s_2-p)} \exp\left(\frac{2p\xi_n}{c} l\sqrt{\varepsilon_3}\right)-1\right]^{-1} + \right.$$

$$\left. + \left[\frac{(s_1+p\varepsilon_1/\varepsilon_3)(s_2+p\varepsilon_2/\varepsilon_3)}{(s_1-p\varepsilon_1/\varepsilon_3)(s_2-p\varepsilon_2/\varepsilon_3)} \exp\left(\frac{2p\xi_n}{c} l\sqrt{\varepsilon_3}\right)-1\right]^{-1}\right\} dp, \qquad (4,13)$$

где where

$$s_1=\sqrt{(\varepsilon_1/\varepsilon_3)-1+p^2}, \quad s_2=\sqrt{(\varepsilon_2/\varepsilon_3)-1+p^2}, \quad \xi_n=2\pi nkT/h;$$

Here ε_1, ε_2, ε_3 denote functions of the imaginary frequency $\omega = i\xi$ ($\varepsilon = \varepsilon(i\xi_n)$), k being the Boltzmann constant. Summation is done over the integers n, and the term with n = 0 is to be taken with half the weight. The general formula and limit cases are then discussed. Eq. (4.13) can be simplified because the effect of temperature upon the interaction force between the bodies is generally quite negligible. The thus resulting formula (4.14)

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$$F = \frac{\hbar}{2\pi^2 c^3} \int_0^\infty \int_1^\infty p^2 \xi^3 \varepsilon_3^{3/2} \left\{ \left[\frac{(s_1+p)(s_2+p)}{(s_1-p)(s_2-p)} \exp\left(\frac{2p\xi}{c} l \sqrt{\varepsilon_3}\right) - 1 \right]^{-1} + \right.$$
$$\left. + \left[\frac{(s_1+p\,\varepsilon_1/\varepsilon_3)(s_2+p\,\varepsilon_2/\varepsilon_3)}{(s_1-p\,\varepsilon_1/\varepsilon_3)(s_2-p\,\varepsilon_2/\varepsilon_3)} \exp\left(\frac{2p\xi}{c} l \sqrt{\varepsilon_3}\right) - 1 \right]^{-1} \right\} dp\, d\xi. \qquad (4,14)$$

is suited for distances $l \ll c\hbar/kT$. Also (4.14), however, can be appreciably simplified in two important limit cases:

$$F = \frac{\hbar}{16\pi^2 l^3} \int_0^\infty \int_0^\infty x^2 \left[\frac{(\varepsilon_1+\varepsilon_3)(\varepsilon_2+\varepsilon_3)}{(\varepsilon_1-\varepsilon_3)(\varepsilon_2-\varepsilon_3)} e^x - 1 \right]^{-1} dx\, d\xi \qquad (4,15)$$

or

$$F = \frac{\hbar\bar{\omega}}{8\pi^2 l^3}, \quad \bar{\omega} = \int_0^\infty \frac{[\varepsilon_1(i\xi)-\varepsilon_3(i\xi)]\,[\varepsilon_2(i\xi)-\varepsilon_3(i\xi)]}{[\varepsilon_1(i\xi)+\varepsilon_3(i\xi)]\,[\varepsilon_2(i\xi)+\varepsilon_3(i\xi)]} d\xi. \qquad (4,18)$$

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respectively, holds for "small" distances (i.e., small with respect to the lengths λ_0 of the waves that are typical of the absorption spectra of the given bodies). $|\omega|$ is a frequency that is typical of the absorption spectra of all three media. For "large" distances $l \gg \lambda_0$,

$$F = \frac{\hbar c}{32\pi^2 l^4 \sqrt{\varepsilon_{30}}} \int_0^\infty \int_1^\infty \frac{x^3}{p^2} \left\{ \left[\frac{(s_{10}+p)(s_{20}+p)}{(s_{10}-p)(s_{20}-p)} e^x - 1 \right]^{-1} + \right.$$
$$\left. + \left[\frac{(s_{10}+p\,\varepsilon_{10}/\varepsilon_{30})(s_{20}+p\,\varepsilon_{20}/\varepsilon_{30})}{(s_{10}-p\,\varepsilon_{10}/\varepsilon_{30})(s_{20}-p\,\varepsilon_{20}/\varepsilon_{30})} e^x - 1 \right]^{-1} \right\} dp\,dx, \qquad (4,19)$$
$$s_{10} = \sqrt{(\varepsilon_{10}/\varepsilon_{30}) - 1 + p^2}, \quad s_{20} = \sqrt{(\varepsilon_{20}/\varepsilon_{30}) - 1 + p^2},$$

holds after the substitution $x = 2pl\xi/c$, where ε_{10}, ε_{20}, ε_{30} denote the electrostatic values of the dielectric constant. From (4.19),

$$F = \frac{\hbar c}{16\pi^2 l^4 \sqrt{\varepsilon_{30}}} \int_0^\infty \int_1^\infty \frac{x^3\,dp\,dx}{p^2(e^x-1)} = \frac{\pi^2}{240} \frac{\hbar c}{\sqrt{\varepsilon_{30}}\,l^4}. \qquad (4,21)$$

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follows for metals, and

$$F = \frac{\pi^2}{240} \frac{\hbar c}{l^4} \frac{1}{\sqrt{\varepsilon_{30}}} \left(\frac{\varepsilon_{10} - \varepsilon_{30}}{\varepsilon_{10} + \varepsilon_{30}} \right)^2 \varphi_{ДД} \left(\frac{\varepsilon_{10}}{\varepsilon_{30}} \right), \qquad (4,22)$$

for equal bodies. If the gap between the two bodies is filled with a liquid metal, the interaction force decreases as l^{-3} at "small" distances, and as l^{-5} at "large" distances. B. V. Deryagin, I. I. Abrikosova made the first reliable measurements of molecular attractive forces between solid bodies. For two metals separated by a vacuum

$$F = \frac{kT}{8\pi l^3} \left[1 + 2 \left(\frac{4\pi kTl}{\hbar c} \right)^2 \exp \left(- \frac{4\pi kTl}{\hbar c} \right) \right] \qquad (4.30)$$

At "large" distances

$$F = \frac{\hbar c}{l^4} \frac{23}{640\pi^2} (\varepsilon_{10} - 1)(\varepsilon_{20} - 1) \qquad (4.35)$$

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holds for the attractive force between two split up bodies. This corresponds to the interaction of two atoms with the energy

$$U = -\frac{23\hbar c}{4\pi R^7}\alpha_1\alpha_2 \quad (4.36)$$

The interaction energy between two atoms in a liquid is

$$U(R) = -\frac{3\hbar}{16\pi^3 R^6}\int_0^\infty \left(\frac{\partial\varepsilon_1(i\xi)}{\partial N_1}\right)_{N_1=0}\left(\frac{\partial\varepsilon_2(i\xi)}{\partial N_2}\right)_{N_2=0}\frac{d\xi}{\varepsilon^2(i\xi)}. \quad (4{,}40)$$

at "small" distances and

$$U(R) = -\frac{23\hbar c}{64\pi^3\varepsilon_0^{3/2}R^7}\left(\frac{\partial\varepsilon_{10}}{\partial N_1}\right)_{N_1=0}\left(\frac{\partial\varepsilon_{20}}{\partial N_2}\right)_{N_2=0}. \quad (4{,}41)$$

at "large" distances.

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$$U(R) = -\frac{27\hbar V^2}{16\pi^3 R^6} \int_0^\infty \left[\frac{\varepsilon'(i\xi) - \varepsilon(i\xi)}{\varepsilon'(i\xi) + 2\varepsilon(i\xi)} \right]^2 d\xi, \quad R \ll \lambda_0, \qquad (4,42)$$

and

$$U(R) = -\frac{207 V^2}{64\pi^3 R^7} \frac{\hbar c}{\sqrt{\varepsilon(0)}} \left[\frac{\varepsilon_0' - \varepsilon_0}{\varepsilon_0' + 2\varepsilon_0} \right]^2, \quad R \gg \lambda_0, \qquad (4,43)$$

hold for the interaction force of emulsion particles at "small" and "large" distances, respectively. The theory described in the present paper is also suited for calculating the thermodynamic quantities of a thin liquid film on the surface of a solid. Simply $\varepsilon_2 = 1$ is to be put in the earlier found formulas (e.g., general formula (4.13)) for determining μ. The function $\mu(T,l)$ determines all thermodynamic quantities of the film. A report is finally given of the negligibly small contribution of forces of non-electromagnetic origin (V. L. Ginzburg is mentioned), and liquid helium films are discussed. $\mu \sim l^{-3}$ is to be

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expected for the actual thicknesses of the helium film, and $1 - z^{-1/3}$ for the film profile. There are 13 figures and 30 references: 15 Soviet-bloc and 15 non-Soviet-bloc. The two most recent references to English-language publications read as follows: L. G. Grimes, L. G. Jackson, Philos. Mag. 4, 1346 (1959). I. A. Kitchener, A. P. Prosser, Proc. Roy. Soc. A 242, 403 (1959).

Card 14/14

LANDAU, Lev Davydovich, akademik; LIFSHITS, Yevgeniy Mikhaylovich, prof.; MARGULIS, U.Ya., red.; AKHLAMOV, S.N., tekhn. red.

[Field theory] Teoriia polia. Izd.4., ispr. i dop. Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1962. 422 p. (Their Teoreticheskaia fizika, t.2.) (MIRA 15:3)

(Field theory)

LANDAU, Lev Davydovich, akademik; LIFSHITS, Yevgeniy Mikhaylovich, prof.; LIVSHITS, B.L., red.; PLAKSHE, L.Yu., tekhn.red.

[Quantum mechanics] Kvantovaia mekhanika. Izd.2., perer. i dop. Moskva, Fizmatgiz. Vol.3. [Nonrelativistic theory] Nereliativistskaia teoriia. 1963. 702 p. (MIRA 17:1)

LIFSHITS, Ye.M.; KHALATNIKOV, I.M.

Problems in relativistic cosmology. Usp. fiz. nauk 80 no.3: 391-438 Jl '63. (MIRA 16:9)
(Cosmology) (Relativity (Physics))

LANDAU, Lev Davydovich, akademik; LIFSHITS, Yevgeniy Mikhaylovich, prof.; VIRKO, I.G., red.

[Statistical physics] Statisticheskaia fizika. Izd.2., pererer. Moskva, Nauka, 1964. 567 p. (MIRA 18:1)

L 3866-66 EWT(d)/EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/EWP(k)/EWP(b)/EWA(h)/ETC(m)/ 42
AM5023895 EWA(c) JD/WW/EM BOOK EXPLOITATION UR/ 531 36 B+1

Landau, Lev Davidovich; Lifshits, YEvgeniy Mikhaylovich

Theoretical physics. v. 7: Theory of elasticity 24 (Teoreticheskaya fizika. t. 7: Teoriya uprugosti) 3d ed., rev. and enl. Moscow, Izd-vo "Nauka", 1965. 202 p. illus., index. 62,000 copies printed.

TOPIC TAGS: elasticity theory, elastic wave, dislocation, heat conductivity, viscosity

PURPOSE AND COVERAGE: This book is Volume 7 of a series "Theoretical Physics" published by Izd-vo "Nauka". The theory of elasticity is presented as a separate book in this third edition of the above work. The preceding edition (1953) included hydrodynamics and appeared under the title Mekhanika sploshnykh sred; (this book was translated by J. B. Sykes and W. H. Reid of the Pergamon Press under the title Fluid Physics, Addison-Wesley Publishing Company, 1957). The third edition contains a few relatively minor corrections and additions and a new chapter on the microscopic theory of dislocations. As this book is intended primarily for physicists, such

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special problems as complicated mathematical methods for the theory of elasticity, the theory of shells, et cetera, are only briefly discussed. The problems of heat conductivity, viscosity of solids, and theory of elastic vibration and waves are given consideration.

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OTHER: 000

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Card 3/3

LANDAU, Lev Davydovich, akademik; LIFSHITS, Yevgeniy Mikhaylovich, prof.; VIRKO, I.G., red.

[Mechanics] Mekhanika. Moskva, Nauka, 1965. 203 p.

[Theory of elasticity] Teoriia uprugosti. Moskva, Nauka, 1965. 202 p. (MIRA 18:8)

LANDAU, Lev Davydovich [deceased]; AKHIYEZER, Aleksandr Il'ich;
LIFSHITS, Yevgeniy Mikhaylovich; DUBROVA, V.Ya., red.

[General physics course; mechanics and molecular physics]
Kurs obshchei fiziki; mekhanika i molekuliarnaia fizika.
Moskva, Nauka, 1965. 384 p. (MIRA 19:1)

LIFSHITS, Ye.V.; BUGAYEVA, N.I.

Spectrum analysis of chromium for impurity content. Fiz. sbor. no.4:491-493 '58. (MIRA 12:5)

1. Fiziko-tekhnicheskiy institut AN USSR, Khar'kov.
(Chromium--Spectra)

18(3), 7(6)

SOV/32-24-12-24/45

AUTHORS: Lifshits, Ye. V., Konovalov, V. G., Yerko, V. F.

TITLE: Spectral Analysis of Binary Iron-Chromium Alloys (Spektral'nyy analiz binarnykh splavov zheleza s khromom)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 12, pp 1483 - 1484 (USSR)

ABSTRACT: A method is described for determining chromium in iron (0.1-30% Cr), and for determining iron in chromium (0.1 - 1% Fe). Unalloyed samples, thin metal films (to 20 μ), and dispersions of chromium in the surface of iron-chromium alloys(to a depth of 750 μ) were investigated. The metal films were obtained by evaporating the alloy on an aluminum support and in a high vacuum. The standard solutions were prepared by dissolving the material and were determined using the porous cup electrode method of Feldman (Fel'dman) (Ref 1). A Q-12 spectrograph and a IG-2 generator were used. The analysis of

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the unalloyed samples was carried out in the usual way. The accuracy of the method is ± 6%. Comparison of the analytical results with those obtained chemically (by N.V.Sivokon') shows a satisfactory agreement (Table). The analytical results on the dispersion of the chromium (Figure) were used to calculate the diffusion coefficient for chromium in iron. The metal films on the aluminum support were investigated in a local analysis using a generator, and these results were found to agree with the analysis of the solutions. N.I.Bugayeva and L.N. Mosova participated in the experiments. There are 1 figure, 1 table and 1 reference.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physical-Technical Institute, Academy of Sciences,UkrSSR)

5 (2), 24 (7)

AUTHORS: Lifshits, Ye. V., Bugayeva, N. I. SOV/32-25-8-17/44

TITLE: Spectrum Analysis of Chromium for Establishing Its Contents of Impurities

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 8, pp 952 - 954 (USSR)

ABSTRACT: L. N. Mosova participated in the present paper. An analysis method has been elaborated for metallic chromium (I) with a spectrograph of medium dispersity. The determination of impurities (Im) which are difficultly volatile, is effected by directly fractionated evaporation of the sample in a dc arc (DA), and that of the readily volatile (Im) by enrichment according to the evaporation method (Ref 1). The (I)-sample is transformed into chromium oxide (II) before the determination. It was established that Cd, Bi, Pb, Sn, and Sb evaporate considerably faster in the first 5-20 seconds from the crater of the carbon electrode in the (DA) than the basic substance. Al, Fe, Si, Ni, and Mg evaporate in the same way as does (I) during a longer time period. Two series of standard samples (SS) are being used, one for the determination of Fe, Al, Si, Ni, Co, Mg, Cu, Be, and larger quantities of readily volatile (Im),

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the other series for the (I)-analysis of readily volatile (Im). The article contains descriptions of the following: preparation technique of the (SS) and the samples, analytical lines, sensitivity and determination accuracy of the analysis (Table). The purity of alumothermic (I) was made for the elements Al, Fe, and Si. (I) served as inner standard and nickel was also investigated. An ISP-22 spectrograph was used. For the determination of readily volatile (Im) the above-mentioned method was applied (Refs 1,2), the metal sample was transformed into its oxide. The evaporation temperature of 1500° proved to be the most favorable; they used an evaporator system FIAN and an ISP-22 spectrograph. From 1955 to 1957 several (I) analyses were made according to the developed method. The determination accuracy is given with a probable mean error of approximately 12%. There are 2 figures, 1 table, and 3 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Institute of Physics and Technology of the Academy of Sciences, UkrSSR)

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LIFSHITZ YE. V.

34437

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D299/D304

24.2120 (1049,1163,1538)

AUTHORS: Lifshyts', Ye. V., Yehorov, A.M., and Zahorodnov, O.H.

TITLE: Measuring high-frequency field strength in a plasma by means of the Stark effect

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 6, 1961, 793 - 796

TEXT: A method is proposed for measuring parameters of plasma waveguides which has the advantage (over existing methods) of introducing only very small perturbations. The Stark effect is used for determining the mean field strength in plasma waveguides in a magnetic field. First, the radial distribution of the electric-field components in the waveguide are determined, and then the phase velocity of the wave and the field strength at the waveguide axis. The field-strength measurements were based on the Epstein-Schwartzschild formula:

$$\Delta\nu = \frac{3hE}{8\pi^2\mu Ze}\{n_2(n_\eta - n_\xi)_2 - n_1(n_\eta - n_\xi)_1\} \qquad (1)$$

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for the static Stark effect. It was found that the magnitude of the Stark line broadening was considerably greater in the experiments conducted, than line broadening due to other factors which could therefore be neglected. The diameter of the plasma waveguide was 20 mm, the plasma density varied between $10^{10} - 10^{11}$. The field strength was measured by the broadening of the H_γ - line. This line was selected because it was more suitable for the operating conditions of the spectrograph used in the experiment. The discharge spectrum was recorded on photographic plates of type "Pankhrom"; the exposure varied between 30 minutes to 2 hours. A figure shows a typical line shape. The line broadening, due to the experimental apparatus, was taken into account be means of a calibration device, incorporating a thyratron. From formula (1) follows that the field strength $E = 2.31 \cdot 10^3 \Delta\lambda$, where $\Delta\lambda$ is expressed in Å, and E -- in kw/cm. The obtained values of E are listed in a table, together with the values of $\Delta\lambda$. The described method is effective; its effectiveness increases with higher field strength. The use of photoelectric recording ensures much greater speed of measurement. There

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AUTHORS: Yerko, V.F., Lifshyts', Ye.V., Konovalov, V.H., Dubyns'kyy, I.H., and Buhayova, N.I.

TITLE: Spectral analysis of magnesium-beryllium alloys

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 6, 1961, 837 - 842

TEXT: The present work was prompted by the need to develop magnesium-beryllium alloys for protective coatings of heat-transfer elements. Binary and mutlicomponent magnesium alloys were investigated, with beryllium (as basic addition), aluminum, calcium and zirconium. The admixtures were determined by the method of spectral analysis of solutions. As a control method, the spectrophotometric method was used for determining beryllium. Sodium and potassium were determined by the method of flame spectrophotometry and photoelectric recording of spectra. The beryllium concentration in binary alloys was determined by the three-specimen method. The multicomponent magnesium alloys were analyzed for Al, Be, Ca, Zr (basic ad-

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ditions), and Fe, Cu and Ni (impurities). The calibration curves are shown in a figure. The results of spectral- and chemical analysis were in good agreement. As a direct method of analysis of the binary alloy, magnesium and beryllium were distilled simultaneously in a high vacuum. Such a method made it possible to prepare a series of sufficiently homogeneous samples with a beryllium concentration of 0.0003 to 6.0 %. From a table it is evident that the results of direct analysis of metallic specimens and of analysis of the solutions were in good agreement. The spectrophotometric method of determining the beryllium concentration in the alloy, involved the use of sulfosalycilic acid and of trilon Б (B) (the latter for the purpose of cancelling the effect of magnesium). The spectrophotometer СФ -4 (SF-4) was used. The optical density was measured at a wavelength of λ = 317 mμ. The method permitted the determination of a beryllium concentration of 0.005 - 10 %. The data related to the flame spectrophotometric method used for detecting the presence of sodium potassium in the magnesium alloy, are listed in a table. There are 1 figure, 5 tables and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The reference to the English-language publication

Spectral analysis of magnesium- ... S/185/61/006/006/021/030
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reads as follows: H.V. Meek, C.V. Banks, Chemistry, 22, no. 12, 1512, 1950.

ASSOCIATION: Fizyko-tekhnichnyy instytut AS UkrRSR (Physicotechnical Institute of the AS UkrRSR, Kharkiv)

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34440
S/185/61/006/006/022/030
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18.8100

AUTHORS: ~~Lifshyts', Ye.V.,~~ Yerko, V.F., Buhayova, N.I., and Mosova, L.M.

TITLE: Spectral analysis of certain pure metals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 6, 1961, 846 - 850

TEXT: Methods are described for spectral analysis of pure metals, used in the spectrum laboratory of the Physicotechnical Institute of the AS UkrRSR. The following metals were investigated with respect to 7 to 20 impurities: Manganese, chromium, beryllium, nickel, cobalt, molybdenum, zirconium, zinc and iron; silicon was also investigated. The impurity concentration ranged from 10^{-1} to 10^{-4} %. The analysis of pure metals is based on the method of powder-oxide analysis. In order to increase the sensitivity of analysis of the concentration, the following methods were used: Fractionation in a d.c.-arc, evaporation from the melt (the so-called globule arc), enrichment by means of impurity distillation, and chemical methods of X

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concentration of impurities. First, the method of fractionation is considered. The specimen, placed in the graphite electrode, formed the anode of the arc, whereas the cathode was formed by a graphite rod. Preparation of the specimens, Conditions of the analysis and Sensitivity of determination of the concentration are given in a table. The sensitivity varied between $3 \cdot 10^{-3}$ to $1 \cdot 10^{-4}$%. The method is accurate to within ± 10 - 20 %. The impurity concentration and the sensitivity can be considerably increased by using a distillation method, developed by S.L. Mandel'shtam et al., whereby the processes of extraction of impurities and of their spectral excitations were separated. The authors used this method for detecting the presence of readily volatile impurities in chromium. The vaporization temperature was 1500°C, the duration - 90 seconds. The sensitivity of detecting Pb, Bi, Sn, Cd and Sb, was $1 \cdot 10^{-4}$ %. The globule-arc method yields high sensitivity; it is mainly used for analysis of metal oxides with moderate melting point and which have (in the melted state) high electrical conductivity. The authors analyzed (by this method) nickel, cobalt, and iron of high purity. The sensitivity of this method is by one order of magnitude higher than

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that of the fractionation method; the increase in sensitivity is particularly noticeable in the detection of readily volatile substances. The method of chemical enrichment of the specimens with subsequent spectral analysis of impurity concentration was used for beryllium, molybdenum and iron of high purity. The method involves the separation of the basic element by means of a selective reaction. The use of the spectro-chemical method makes it possible to considerably increase the sensitivity of analysis, which reaches $1 \cdot 10^{-6}$ % for certain impurities (with an error of ± 20 %). There are 2 tables and 9 Soviet-bloc references.

ASSOCIATION: Fizyko-tekhnichnyy instytut AS UkrRSR (Physicotechnical Institute of the AS UkrRSR, Kharkiv)

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Card 3/3

LIFSHITS, Ye.V.; MOSOVA, L.N.

Spectral analysis of pure iron. Zav.lab. 28 no.11:1329 '62. (MIRA 15:11)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

(Iron—Spectra)

LIFSHITS, Ye.V. [Lifshyts', IE.V.]; YEGOROV, A.I. [IEhorov, A.M.]; ZAGORODNOV, O.G. [Zahorodnov, O.H.]

Measuring the strength of a high-frequency field in a plasma with the aid of the Stark effect. Ukr.fiz.zhur. 6 no.6:793-796 N-D '61. (MIRA 16:5)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.
(Electric fields) (Plasma (Ionized gases))
(Stark effect)

YERKO, V.F. [IErko, V.F.]; LIFSHITS, Ye.V. [Lifshyts', IE.V.]; KONOVALOV, V.G. [Konovalov, V.H.]; DUBINSKIY, I.G. [Dubyns'kyi, I.H.]; BUGAYEVA, N.I. [Buhaiova, N.I.]

Spectrum analysis of magnesium-beryllium alloys. Ukr.fiz.zhur. 6 no.6: 837-842 N-D '61. (MIRA 16:5)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.
(Magnesium-beryllium alloys—Spectra)

LIFSHITS, Ye.V. [Lifshyts', IE.V.]; YERKO, V.F. [IErko, V.F.]; BYGAYEVA, N.I. [Buhaiova, N.I.]; MOSOVA, L.N. [Mosova, L.M.]

Spectrum analysis of some pure metals. Ukr.fiz.zhur. 6 no.6:846-850 N-D '61. (MIRA 16:5)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.
(Metals) (Spectrochemistry)

ACCESSION NR: AP4010407 S/0185/63/008/012/1328/1334

AUTHOR: Lifshy*ts', E. V.; Kry*vulya, S. S.; Us, V. S.

TITLE: Measurement of high-frequency field intensity in a plasma by means of the Stark effect

SOURCE: Ukrayins'ky*y fiz. zhurnal, v. 8, no. 12, 1963, 1328-1334

TOPIC TAGS: field intensity, field strength, high-frequency field, plasma, magnetic field, H sub beta, Stark effect

ABSTRACT: The present work was carried out to determine the dependence of the intensity of a high-frequency field on the high-frequency power introduced into a plasma wave-guide and the absolute value of the intensity of the high-frequency field. Broadening of the H sub beta line due to the Stark effect was measured to determine the field intensity. As was to be expected, E is proportional to the square root of w, where w is the high-frequency power. "The author is grateful to O. H. Zahorodnov and V. H. Padalets' for valuable advice and to V. E. Ivanov for interest in the work and discussion of the results." Orig. art. has: 2 formulas and 6 figures.

ACCESSION NR: AP4010407

ASSOCIATION: Fizy*ko-tekhnichny*y insty*tut AN URSR Kharkov (Physicotechnical Institute AN URSR)

SUBMITTED: 22May63 DATE ACQ: 20Jan64 ENCL: 00

SUB CODE: PH NO REF SOV: 005 OTHER: 002

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ACCESSION NR: AP4017399 S/0185/64/009/002/0207/0209

AUTHOR: Lifsh*ts', E. V.

TITLE: On the possibility of spectroscopic observation of electron beam melting

SOURCE: Ukrayins'ky*y fizy*y zhurnal, v. 9, no. 2, 1964, 207-209

TOPIC TAGS: electron beam, electron beam melting, electron-plasma interaction, spectroscopic observation, plasma spectroscopic observation, electron ionization

ABSTRACT: The possibility of continuous observation of electron beam melting by the plasma emission spectra is considered. The plasma is formed as a result of ionization by an electron beam of the gas and of the vapors of the melting metal.

Atomic excitation originates both from collision with the beam electrons and from vibration excitation caused by the beam passing through the plasma.

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ACCESSION NR: AP4017399

As a result of these excitations the plasma electrons obtain energy enough to ionize and excite the plasma atoms and ions.

The method is applicable in the case when the pressure in the melting chamber is enough to form the plasma.

"In conclusion I thank V. E. Ivanov and A. K. Berezin for valuable discussions." Orig. article has no graphics.

ASSOCIATION: Fizy*ko-tekhnichny*y Insty*ty* AN URSR, Kharkov (Physics-Technical Institute, AN URSR)

SUBMITTED: 25Jul63 DATE ACQ: 19Mar64 ENCL: 00

SUB CODE: ML, PH NO REF SOV: 003 OTHER: 001

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ACCESSION NR: AP5002171 S/0032/65/031/001/0059/0060

AUTHOR: Lifshits, Ye. V.

TITLE: Investigation of diffusion processes by the method of localized spectral analysis

SOURCE: Zavodskaya laboratoriya, v. 31, no. 1, 1965, 59-60

TOPIC TAGS: diffusion annealing, spectrum analysis, molybdenum, chromium, nickel

ABSTRACT: The method of localized spectral analysis is used to investigate the process of interdiffusion in triple layer samples of molybdenum, chromium, and nickel. The sample serves as one electrode, while a steel knife edge placed parallel to the surface of the sample along the x axis is used as the other electrode. By measuring the relative intensities of the appropriate spectral lines at different positions along the arc, the concentration of a particular element as a function of depth (x) can be determined. The method is applied specifically to triple layer samples Mo-Ni-Cr and Mo-Cr-Ni obtained by vacuum condensation of chromium and nickel onto molybdenum sheets. The concentrations with depth are measured and shown graphically for samples before and after annealing at 1100C for 100 hours. Orig. art has: 3 diagrams.

L 22197-65

ACCESSION NR: AP5002171

ASSOCIATION. Fiziko-tekhnicheskiy institut Akademii nauk UkrSSR (Institute of Physics and Technology, Academy of Sciences, UkrSSR)

SUBMITTED: 00 ENCL: 00

SUB CODE: OP, MM NO REF SOV: 008 OTHER: 000

Card 2/2

APPROVED FOR RELEASE: 07/12/2001 CIA-RDP86-00513R000929910008-3"

LIFSHITS, Ye.V.

Study of diffusion processes by the method of local spectral analysis. Zav. lab. 31 no.1:59-60 '65. (MIRA 18:3)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

MOSOVA, L.N.; LIFSHITS, Ye.V.

Spectral method of determining boron in nickel. Zav. lab. 31 no.2:183-184 '65. (MIRA 18:7)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

L 53775-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(z)/EWP(b) Pad/Pu-4 IJP(c) JD/HW/JG

ACCESSION NR: AP5014490 UR/0032/65/031/006/0690/0692
543.42

49
48
B

AUTHORS: Balenko, E. P.; Lifshits, Ye. V.

TITLE: Spectral analysis of niobium

SOURCE: Zavodskaya laboratoriya, v. 31, no. 6, 1965, 690-692

TOPIC TAGS: niobium, spectrum analysis, impurity content

ABSTRACT: A method is presented for determining 13 impurities in metallic niobium: Pb, Bi, Sn, Sb, Fe, Si, Ni, Co, Ti, Cr, Al, Mn, Ta, using a mean dispersion spectrograph. The method of fractional vaporization is employed to avoid difficulties with the band structure of the niobium spectrum. A dc arc (240 v, 10 a) is used to obtain the spectrum. The analytic pairs of lines are given for each of the impurities. Analysis was made of three standard samples, the results of which are given in a table. The method of fractional vaporization cannot be used for tantalum since it is less volatile than niobium, so the method of complete combustion of the sample was used. The sensitivity for all the elements except tantalum was $5\cdot10^{-4}-1\cdot10^{-3}\%$ (Ta - 0.1%). The reproducibility of the analysis results was ±15%. Orig. art. has: 2 diagrams and 2 tables.

Card 1/2

L 53775-65

ACCESSION NR: AP5014490

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk UkrSSR (Physicotechnical Institute, Academy of Sciences, UkrSSR)

SUBMITTED: 00 ENCL: 00 SUB CODE: OP, MM

NO REF SOV: 000 OTHER: 000

Card 2/2

L 3920-66 EWT(1)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2 IJP(c) AT

ACCESSION NR: AP5017890 UR/0051/65/019/001/0019/0025

533.9 45

B

AUTHOR: Lifshits, Ye. V. 44,55

TITLE: Spectroscopic study of the interaction between charged particle beams and a plasma 21,44,55

SOURCE: Optika i spektroskopiya, v. 19, no. 1, 1965, 19-25

TOPIC TAGS: plasma beam interaction, plasma diagnostics, spectrum analysis

ABSTRACT: The purpose of the paper is to assess the possibility of using spectroscopic methods for a qualitative investigation of processes involved in plasma-beam interaction and for a quantitative determination of the main parameters describing the interaction. The author analyzes theoretically a spectroscopic method based on the comparison of the emission of identical spectral lines produced by the beam and the plasma, in both the linear stage of the interaction and in the saturation stage. It is shown that from the known expression for the ratio of the emission intensities of the beam and of the plasma-beam system, and from known basic characteristics of the emission (excitation function, effective excitation cross section), it is possible to determine both the basic plasma parameters such as temperature and density, and their time dependence. Orig. art. has: 18 formulas.

Card 1/2

L 3920-66
ACCESSION NR: AP5017890

ASSOCIATION: none

SUBMITTED: 02Apr64 ENCL: 00 SUB CODE: ME, OP

NR REF SOV: 005 OTHER: 004

Card 2/2

L 23568-66 EPF(n)-2/EWT(l)/ETC(f)/EWG(m) IJP(c) AT/GS

ACC NR: AT6008861 SOURCE CODE: UR/0000/65/000/000/0207/0221

.73

B+1

AUTHOR: Lifshits, Ye. V.; Berezin, A. K.; Bolotin, L. I.; Lyapkalo, Yu. M.

ORG: none

TITLE: Spectroscopic investigation of the interaction between beams of charged particles and a plasma

SOURCE: AN UkrSSR. Magnitnyye lovushki (Magnetic traps). Kiev, Naukova dumka, 1965, 207-221

TOPIC TAGS: electron temperature, ion temperature, plasma physics, charged particle, electron beam, spectroscopy

ABSTRACT: The authors consider the possibilities for spectroscopic analysis of the fundamental processes which take place during interaction of charged particles with a plasma and determine the basic parameters and relationships which are characteristic for this interaction. The electron temperature, ion temperature and rf field strength are determined. The measurements were made for instantaneous and time-averaged values. An electron beam (with a current of 12 a and an energy of 20 kv) was passed through a discharge tube in which the pressure was varied from $8 \cdot 10^{-4}$ to 10^{-2} mm Hg. The current pulse duration was 4.5 μsec with a prf of 50 cps. The beam was 20 mm in diameter. The density of the plasma formed during passage of the beam through the shock tube

2

L 23568-66

ACC NR: AT6008861

reached a value of $6 \cdot 10^{11}$ cm^{-3}. The plasma and beam were located in a constant magnetic field with an intensity of 1200 oersteds. The shock tube was filled successively with argon, helium, hydrogen, air and mixtures of gases. A detailed description is given of the experimental procedure and analytical formulas used in measuring the electron and ion temperatures. Orig. art. has: 9 figures, 4 tables, 8 formulas.

SUB CODE: 20/ SUBM DATE: 20Oct65/ ORIG REF: 009/ OTH REF: 006

Card 2/2 PB

L 29622-66 EWT(1)/ETC(f) IJP(c) AT

ACC NR: AP6018736 SOURCE CODE: UR/0057/66/036/006/1087/1093

AUTHOR: Lifshits, Ye. V.; Berezin, A. K.; Lyapkalo, Yu. M.

ORG: none

64
60
B

TITLE: Spectroscopic investigation of the interaction of plasma with charged particle beams

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 6, 1966, 1087-1093

TOPIC TAGS: plasma, plasma oscillation, plasma high frequency oscillation, plasma electron temperature, plasma ion temperature, electron beam, charged particle beam

ABSTRACT: A spectroscopic study was made of processes taking place in the interaction of beams with plasma in order to establish quantitatively the main parameters of the process and their interdependencies. Electron temperature, ion temperature, and high-frequency field strength were determined experimentally. In the electron-temperature measurements, a 12-amp, 20-kev electron beam was passed through a discharge tube at pressures from 8×10^{-4} to 10^{-2} mm Hg. Pulse duration was 4.5 μsec, frequency 50 pulses per sec, and beam diameter 20 mm. Plasma density with passage of the beam reached 6×10^{11} per cm^3. The process took place in a constant magnetic field of 0.12 emu. The discharge tube was filled successively with argon, helium, hydrogen, and air. High-frequency oscillations generated by passing an electron beam through a plasma were measured within the 600—2000 and 2400—7500 Mc ranges.

Card 1/2 UDC: 533.9

L 29622-66

ACC NR: AP6018736

4

Oscillations within these ranges occurred at pressures of 5×10^{-3} and lower, the averaged electron temperatures being 88, 65, and 66 ev at 5×10^{-3}, 4×10^{-3}, and 3×10^{-3} mm Hg, respectively. The electron temperatures at higher pressures (1×10^{-2} mm Hg), where no oscillations occurred, were 2 to 3.5 times lower. Measurements of the radiation intensity were conducted to determine the character of its relation to the current pulse. The shape of the luminosity curve suggested that it is a result of high-frequency plasma oscillations and, to a greater degree, of the collisionless heating of plasma electrons. The ion-temperature measurements were based on profiles of the spectral lines of ions and atoms. A table summarizes the results from ion-temperature measurements for oxygen, helium, hydrogen, and air and hydrogen. At higher pressures, high-frequency oscillations did not occur, while ion temperatures were about half the values given in the table. The temperature rise apparently is caused by both collisions and the effect of a constant electric field. A profile widening observed in the case of hydrogen atoms is attributed to the high-frequency Stark effect. The authors thank Ya. B. Faynberg for a continued interest in the work and for valuable discussions and V. Ye. Ivanov, L. I. Bolotin, and V. G. Padalka for interest in the work and discussion of results. Orig. art. has: 4 figures and 2 tables. [FP]

SUB CODE: 20/ SUBM DATE: 26Oct64/ ORIG REF: 011/ OTH REF: 005/ ATD PRESS: 5014

Card 2/2

LIFSHITS, YU. B.; RYZHOV, O.S. (Moscow)

"On the asymptotic type of flow in the vicinity of Laval nozzle centre".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

L 51839-65 EWT(1)/EWP(m)/EWA(d)/FCS(k)/EWA(1) Pd-1

ACCESSION NR: AP5017008 UR/0208/64/004/005/0954/0958

AUTHOR: Lifshits, Yu. B. (Moscow); Ryzhov, O. S. (Moscow)

19

B

TITLE: Certain exact solutions of transonic gas flow equations

SOURCE: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 4, no. 5, 1964, 954-958

TOPIC TAGS: gas flow, transonic aerodynamics

ABSTRACT: In their note the authors reformulate previously known solutions of the equations describing the gas flow in the vicinity of a line passing through the speed of sound. This is followed by a discussion of the repercussion of a slight break in the sonic line. Contrary to the conclusions of A. A. Nikol'skiy and G. I. Taganov (Prikl. matem. i mekhan., 1946, 10, No 4, 481-502), there can exist a simple wave-type gas flow in the region between some point on the sonic line and the break in compression is preceded by the emergence of a boundary line representing the envelope of the family of rectilinear characteristics. The article discusses also certain aspects of other special solutions (trinomial solution, plane-parallel flow). Orig. art. has: 2 figures, 27 formulas.

Card 1/2

L 51839-65

ACCESSION NR: AP5017008

0

ASSOCIATION: none

SUBMITTED: 29Dec63 ENCL: 00 SUB CODE: MA, MF

NO REF SOV: 006 OTHER: 003 JPRS

LL
Card 2/2

ACCESSION NR: AP4012078 S/0020/64/154/002/0290/0293

AUTHORS: Lifshits, Yu. B.; Ry*zhov, O. S.

TITLE: Asymptotic type of plane-parallel flow in vicinity of Laval nozzle center

SOURCE: AN SSSR. Doklady*, v. 154, no. 2, 1964, 290-293

TOPIC TAGS: gas dynamics, Laval nozzle, plane parallel flow, hydromechanics, hydrodynamics, Cauchy problem, subsonic gas flow, transonic gas flow

ABSTRACT: The following differential equation is derived for describing gas flow in the vicinity of the Laval nozzle center:

$$\frac{d\Psi}{dF} = \frac{-6F - 5n\Psi + 6F^2 + 7F\Psi + \Psi^2}{(n^2 - F)\Psi}.$$

An attempt was then made to construct only those fields of the fluid flow which do not possess singularities in the derivatives of the velocity components along the coordinates on the C^0 characteristic in the center of the nozzle. The streamlines at the points of

ACCESSION NR: AP4012078

intersection with C^0 characteristic also do not have any singularities. The gas travel in the intake portion of the nozzle between the axis and the center of the C^0 characteristic is expressed by one of the connecting singular points A (0,0) and C(n^2, $-n$ (n+1)) of the integral curves of equation (6) with an initial segment located to the left of the Ψ axis. The point A corresponds to the Ψ axis; the transition through the point C denotes the intersection of the C^0 characteristic in the physical plane. The nature of the singularity of the flow on the C^0 characteristic is defined by decomposition of the function $\Psi(F)$ in the vicinity of the point C

$$\Psi = -n^2 - n + a_1\Delta F + a_2(\Delta F)^2 + \ldots + b_1(\Delta F)^\lambda + \ldots;$$
$$\Delta F = F - n^2.$$

The coefficients a_i depend only upon n and the arbitrary constant b_1, and the exponent λ of the first term of the irregular part is obtained by

$$\lambda = \frac{5n-7}{n+1}.$$

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ACCESSION NR: AP4012078

Calculations showed that a solution to equation can be obtained with an exponent of K = 20/11 (n = 11) which will yield an analytic gas flow in the vicinity of the CC characteristic. This flow will be obtained with $A_2 = 0.111 A_1$ (A_2 and A_1 - arbitrary constants), whereupon the velocity with a shock wave will remain supersonic. Flows with K = 4/3 and 20/11 can be considered as having an asymptotic nature in the vicinity of the nozzle center, but which can be realized with other forms of walls. The peculiarities in them do not originate on the walls, but in the flow itself, at the point of intersection of the sound line with the axis of symmetry and they then shift to the duct's exhaust part. Orig. art. has: 15 equations.

ASSOCIATION: Vy*chislitel'ny*y tseutr Akademii nauk SSSR (Computer center, Academy of Sciences SSSR)

Card 3/3

S/0020/64/154/005/1052/1055

ACCESSION NR: AP4016500

AUTHOR: Lifshits, Yu. B.; Ry*zhov, O. S.

TITLE: Causes of the formation of shock waves in de Laval nozzles

SOURCE: AN SSSR. Doklady*, v. 154, no. 5, 1964. 1052-1055

TOPIC TAGS: de Laval nozzle, Laval nozzle, supersonic nozzle, shock wave, shock wave formation rocket motor, rocket motor jet

ABSTRACT: The causes leading to the generation of shock waves near the de Laval nozzle throat were analyzed by O.S. Ry* zhov (Prikl. matem. i mekh., 27, no. 2 (1963) 309) on the example of one special solution of a system of equations describing the transonic flow of gas. The present article is devoted to the examination of a more simplified class of solutions of equations for transonic flow

$$-u\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}=0,\quad \frac{\partial u}{\partial y}=\frac{\partial v}{\partial x}.$$

ACCESSION NR: AP4016500

In this particular case, x and y are dimensionless cartesian coordinates, and the dimensionless funtions u and v are proportional to the vector component of the induced particle velocity along these axes. A discontinuous solution of equation (1) produces the following cauchy problem. Suppose that, at y = 0, i.e. on the flow's axis of symmetry. we have

$$u = -A_1|x|^k \text{ when } x<0; \quad u = A_2x^k \text{ when } x>0, \ v=0$$

$$(A_1>0, \ A_2>0).$$

It is assumed that the values for the exponent k are contained within the interval 1 k 2. Discontinuous solutions of system (1) describe a flow with a shock wave. Such equations should satisfy, in addition to the initial data of (2), supplementary boundary conditions on the wave front: the equation for the shock polor line

$$2(v_2 - v_3)^2 = (u_2 - u_3)^2 (u_2 + u_3)$$

ACCESSION NR: AP4016500

and the relation

$$u_2\frac{dx_2}{dy}+v_2=u_3\frac{dx_3}{dy}+v_3,$$

It is easy to show that the unknown solution to the cauchy problem is self-modeling

$$u=y^{2(n-1)}f(\xi),\quad v=y^{3(n-1)}g(\xi),\quad \xi=x/y^n,\quad n=2/(2-k),$$

wherein the equation for the wave front has the form $\xi=\xi_2=$ a constant. The initial data of (2) leads to the requirement that the integral curve of

$$\frac{d\Psi}{dF}=\frac{-6F-5n\Psi+6F^2+7F\Psi+\Psi^2}{(n^2-F)\Psi}.$$

yielding the field of flow near the nozzle throat, would begin and terminate in its singular point A (0,0), which corresponds to the x axis. This curve is defined near A by the expansion

$$\Psi=-\frac{2}{n}F-2\frac{3n^2-7n+4}{n^3}F^2+2\frac{(4n^2-7n+2)(3n^2-7n+4)}{n^6}F^3+\ldots$$

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ACCESSION NR: AP4016500

As concerns the boundary conditions (3) and (4), they assume the form

$$F_2 + F_3 = 2n^2, \quad \Psi_2 + \Psi_3 = -2n\,(7n - 5).$$

in the plane $F\Psi$ If

$$0 < \frac{A_1}{A} < \frac{1}{[4 \sin \pi\,(3/8 - j) \sin \pi\,(1/6 + 2j)]^k},$$

then a shock wave originates with supersonic velocity along both sides. The latter inequalities also assure a further increase in velocity and expansion of flow in the region behind the shock wave; but this expansion takes place more slowly than in continuous flows. Orig. art. has: 2 figures and 12 equations.

ASSOCIATION: Vy*chislitel'ny*y tsentr akademii nauk SSSR (Computer Center Academy of Sciences SSSR)

Card 4/5

ACCESSION NR: AP4016500

SUBMITTED: 17Oct63 DATE ACQ: 12Mar64 ENCL: 00

SUB CODE: AI, PR NO REF SOV: 004 OTHER: 004

Card 5/5

L 16397-65 EWT(1)/EWP(m)/EWG(v)/FCS(k)/EWA(1) Pd-1/Pe-5/Pi-4 AEDC(a)/AEDC(b)/ SSD/SSD(b)/BSD/AFWL/ASD(f)-2/ASD(p)-3/AFETR

S/0020/64/158/003/0562/0565

ACCESSION NR: AP4046369

AUTHOR: Lifshits, Yu. B.; Ry*zhov, O. S.

8

TITLE: Transition through the sonic velocity in Laval nozzles with circular cross section

SOURCE: AN SSSR. Doklady*, v. 158, no. 3, 1964, 662-565

TOPIC TAGS: Laval nozzle, transonic velocity, shock wave, nozzle design, supersonic nozzle

ABSTRACT: Von Karman equations describing axisymmetrical transonic flow are used for the analysis of the flow in circular supersonic nozzles. It is demonstrated that the flow has an asymptotic character in the center of the nozzle. Its special features originate in the flow itself and not on the nozzles' walls. Two types of asymptotic flow are shown with different velocity fields. In the case of discontinuous flow, the shock wave originates in the center of the nozzle and then drifts down the flow. It is concluded that the formation of shock waves in the vicinity of the throat of the nozzle is due to a long transition zone. An increased distance between the throat and the inlet results in a slower expansion of gases

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L 16397-65

ACCESSION NR: AP4046369

and consequently in the formation of flow discontinuities. In a limiting case the velocity behind the shock wave is equal to the critical velocity along the axis of symmetry of the nozzle. Orig. art. has: 11 formulas and 4 figures.

ASSOCIATION: Vychislitel'nyy tsentr Akademii nauk SSSR (Computing Center, AN SSSR)

SUBMITTED: 13Apr64 ENCL: 00 SUB CODE: PR, ME

NO REF SOV: 005 OTHER: 003

L 38564-65 EWT(l)/EWP(m)/EWA(d)/EPR/FCS(k)/EWA(h)/EWA(c) Pd-1/Pi-4 WW

ACCESSION NR: AP5006156 S/0258/65/005/001/0029/0034

35

34

B

AUTHOR: Lifshits, Yu. B.

TITLE: Flow in the vicinity of the point of encounter of a sound line with a density shock

SOURCE: Inzhenernyy zhurnal, v. 5, no. 1, 1965, 29-34

TOPIC TAGS: Shock wave, sound propagation, ultrasonics

ABSTRACT: The author reviews briefly the earlier work on the subject and considers the encounter of a sound line and a weak shock wave such that along the incoming characteristic there is discontinuity of the first derivatives of the velocity vector components, and in addition, the second derivatives are infinite beyond the characteristic. This type of singularity is more complicated than that considered by previous investigators. The hodograph method of S. A. Chaplygin is used for the solution. The results show that finite discontinuities of secon' and higher derivatives of the velocity vector do not give rise to a shock wave at the point of the sound line. This, together with earlie- results, leads to the

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L 38564-65
ACCESSION NR: AP5006156

assumption that in a local supersonic zone produced in flow around a sufficiently smooth profile the shock wave is produced not on the transition line, but somewhere inside the supersonic zone near the sound line, and that a shock wave can be produced directly on the sound line only by a sufficiently strong disturbance. "I thank O. S. Ryzhov for valuable advice and hints." Orig. art. has: 4 figures and 15 formulas.

ASSOCIATION: None

SUBMITTED: 24Apr64 ENCL: 00 SUB CODE: GP

NR REF SOV: 006 OTHER: 003

Card 2/2

L 43106-66 EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(w)/EWP(v)/T-2/EWP(k) IJP(c) NW/EM

ACC NR: AP6011358 SOURCE CODE: UR/0208/66/006/002/0276/0287

AUTHOR: Lifshits, Yu. B. (Moscow); Ryzhov, O. S. (Moscow)

ORG: none

54
B

TITLE: On the variation in gas dispersion in the designed working cycle of a Laval nozzle

SOURCE: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 6, no. 2, 1966, 276-287

TOPIC TAGS: Laval nozzle, gas flow, gasdynamics

ABSTRACT: Gas flow through a Laval nozzle 14 is studied from the standpoint that the formulation of the problem may be simplified because the change in gas dispersion is continuous. At the same time, mathematical simplifications arising from the assumption that small changes in nozzle form are insignificant are avoided, it being assumed that the projection of the contour of the nozzle on the plane of the hodograph is not given, but that its determination must proceed from the process of solution of the boundary value problem itself. The direct problem of the theory of the nozzle thus has two aspects. The first reduces to the question of whether in a unit of time various quantities of gas may be released through nozzle channels of a given form without changing the qualitative properties of the flow. On the other hand, one must assume

UDC: 517.9:533.7

L 43106-66

ACC NR: AP6011358

that the gas dispersion takes on discrete values which differ by finite quantities, thus necessitating qualitative changes with changes in flow. It is shown that the first assumption holds if the asymptotic type of flow changes in the region near the center of the nozzle; but, if it does not change, then changes in gas flow are strictly limited. Various types of asymptotic gas movement are studied to support this hypothesis. Orig. art. has: 61 formulas, 3 figures.

SUB CODE: 20/ SUBM DATE: 26Jul65/ ORIG REF: 007/ OTH REF: 001

Card 2/2 MLP

ALEKSANDROV, Stanislav Konstantinovich, inzh.; LIFSHITS, Yuliya Lazarevna, inzh.; VAL, Grigoriy Aleksandrovich,, inzh.; KREYNDLIN, A.N., nauchn. red.; TELINGATER, L.A., red.

[Advanced methods of prefabrication and assembly of large panel buildings] Peredovye metody zavodskogo izgotovleniia i montazha krupnopanel'nykh zdanii. Moskva, Vysshaia shkola, 1965. 65 p. (MIRA 18:7)

Lifshits, Z. B.

62

V Position of maximum sensitivity of photographic emulsions sensit-
ised with polymethinemerocyanine dyes. M. V. Deichmeister, I. I.
Levkoev, Z. B. Lifshits, and S. V. Natanson (Dokl. Akad. Nauk.
SSSR, 1953, 93, 1057—1059).—Lengthening of the vinylene group
in [2·3 : 3-dimethylindolenine]-, [benzthiazole]-, and [2-quinoline]-
[3-δ-keto-2-thiothiazole]-merocyanine causes a progressive displace-
ment of the $\lambda_{max.}$ for absorption in alcoholic solution and for
sensitisation towards longer wave-lengths; moreover, the bath-
chromic and hypsochromic displacement of $\lambda_{max.}$ increases with the
no. of vinylene units. The significance of these findings is discussed.
R. C. MURRAY.

3

Lifshits, Z. M.

108-8-8/10

AUTHOR: Lifshits, Z.M., Moskovskaya, G.M., Pass, M.I.

TITLE: A New Type of a Large Generator Tetrode (Novyy tip moshchnogo generatornogo tetroda)

PERIODICAL: Radiotekhnika, 1957, Vol 12, Nr 8, pp 66-69 (USSR)

ABSTRACT: The tetrode mentioned is described. It is destined to be used for the short-wave range and is available in two kinds of finish: with air- and with water cooling. The cathode system consists of 12 single filaments of carbide-tungsten wire. The anode is a copper box with a ring to which a piston is welded. To the outer surface of the anode copper blades are welded for air cooling. In its interior the anode is electrolytically coated with black chromium. The grid surface is also coated with zirconium in order to reduce beam energy reflection. The inductivity of the electrode leads, and in particular of the screened grid is low. This was attained by the application of an annular lead of the screened grid. The electric data of the tetrode are: heater filament voltage 6,3 V, filament current 98 A, voltage of anode feed (without modulation) at frequencies below 25 kc ... 10 kV, voltage of the screened grid (maximum) ... 2 kV, slope of the characteristic 20 mA/volt, amplification coefficient of the first grid with respect to the second ...9, emission current of

Card 1/2

33779
S/108/62/017/001/006/007
D271/D304

9.4110 (1003, 1140, 1331)

AUTHORS: Lifshits, Z.M., Moskovskaya, G.M., and Libman, I.S.,
~~Members of the~~ Socieity (see Association)

TITLE: New modulator power triodes

PERIODICAL: Radiotekhnika, v. 17, no. 1, 1962, 59 - 61

TEXT: New types of power triodes ГМ-3А (GM-3A) and ГМ-3А (GM-3B) are described, some drawings, characteristics and the usual catalogue data are given. The triodes were developed for low and video frequency range, with anode dissipation of 7.5 kW; new anti-emission surfacing is used to reduce thermal emission of the grid and high vacuum is obtained by the use of metallic getter. GM-3A triode has water cooled anode, GM-3B - air cooled. The cathode consists of six loops of thoriated carbide tungsten wire forming a cylindrical surface. Cylindrical grid is a helical winding of molybdenum wire covered with platinum in order to reduce thermal emission. The anode of the air cooled triode has cooling fins; the inner surface of the anode is covered with electrolytic black chromium to reduce the

Card 1/2

33779
S/108/62/017/001/006/007
D271/D304

New modulator power triodes

reflection of the cathode radiation and, by this means, to reduce the thermal current of the grid. The getter is of titanium and zirconium. The triodes can be employed as oscillators and for power amplification up to 25 - 30 Mc/s. There are 6 figures.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova (Scientific and Technical Society of Radio Engineering and Electrical Communications imeni A.S. Popov) [Abstractor's note: Name of association taken from first page of journal]

SUBMITTED: July 3, 1961

Card 2/2

LIFSHITS, Z.M.; MOSKOVSKAYA, G.M.; LIBMAN, I.S.

New power modulator trides. Radiotekhnika 17 no.1:59-61 Ja '62. (MIRA 15:2)

1. Deystvitel'nyye chleny Nauchno-tekhnicheskogo obshchestva radiotekhniki i elektrosvyazi imeni Popova.
(Triodes) (Modulation (Electronics))